# COMMUNITY ORGANIZATION FOR LITTER CONTROL

An abstract of a Thesis by
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The problem. Many procedures have been used by federal, state and local agencies to control the littering problem. However, few of these procedures have been adequately evaluated. The present study is an evaluation of one community's attempt to control its litter problem.

Procedures. A litter clean-up drive was planned by a local neighborhood association in which residents were encouraged to clean up the litter on their blocks. Block leaders were identified who were responsible for organizing teams of residents from each of ten experimental blocks to clean up the litter on the blocks. Ten control blocks which were similar in size and traffic flow did not have block leaders. All residents who attended a regular meeting of the association were informed of the clean-up drive and it was promoted by the news media.

Findings. Sixty percent of the litter which was on the ground in the experimental blocks was removed while only 8% of the litter in the control blocks was removed.

Conclusions. The block leader procedure is an effective way to get neighborhood residents to pick up the litter on their blocks as part of a litter clean-up drive.

Recommendations. The organization should use block leaders for all blocks in future clean-up drives. Further research should examine ways to make the procedure more than 60% effective.

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# CHAPTER I

## INTRODUCTION

Litter is considered a problem for four reasons. It is unattractive and it represents wasted energy, e.g., beverage containers can be recycled for considerably less energy than it takes to remanufacture them (Mitchell, 1976). Also it is costly to pick up litter; the estimated cost of cleaning up litter in public areas was $500 million in 1967 (Keep America Beautiful, 1968) and these costs can be assumed to have increased. Finally, authors have cited litter as being dangerous; it can attract pests, serve as the source of disease and can cause accidents (Osborne & Powers, 1980).

Urban areas, in particular, have been cited as having serious litter problems. Strickland-Leggett Research Inc. (1970) found that cities with a population of 250,000 to 1,000,000 people were the most heavily littered. In those cities observers who were walking found, on the average, one item of litter per pace in commercial areas, and one item per two paces in residential areas. The cleanest cities were those with under 25,000 residents (0.239 items/pace) and cities with over a million residents (0.362 items/pace) (Osborne & Powers, 1980).

A variety of procedures have been used by local, state, and federal agencies to control littering. These

procedures include educational anti-litter programs, fines for people who litter and the provision of sidewalk litter cans. The effectiveness of these procedures has rarely been assessed (Osborne & Powers, 1980). However, research conducted by behavior analysts has demonstrated that there are effective procedures for litter control.

One of the early litter studies examined the percent of litter that was returned by children in a movie theater (Burgess, Clark, & Hendee, 1971). The effectiveness of standard procedures such as providing litterbags, giving instructions to pick up litter and showing an anti-litter Disney film titled "Litterbug" was examined along with the effect of two reward procedures. Providing litter bags and showing the anti-litter film had little effect upon the amount of litter returned, while providing litterbags along with verbal instructions to put the litter into the bags and return them to the lobby was moderately effective (36% more litter was returned). A 94% reduction in the amount of litter was observed where children were given empty bags and told if they returned a full bag of litter they would receive 10 cents in exchange. A 95% reduction in the litter was observed when the children were rewarded with a free ticket for a special movie to be held the following week. This research was extended to a forest recreation area (Clark, Burgess, & Hendee, 1972). Children were given garbage bags and told they would earn prizes (e.g., Smokey

Bear patches, comic books, gum) if they helped to pick up the litter. A ranger met with the children in the evening to pass out prizes. A 72% reduction in litter was found.

Rewarding children for clean areas has been demonstrated to be more effective than rewarding them for returning litter (Chapman & Risley, 1974). Three reinforcement procedures were compared. These included asking the children informally to participate, paying them for the volume of litter that they returned, and paying them for lawns that were free of litter. The mean number of pieces of litter on the ground was lower in both the volume and the clean yard conditions than when the children were asked informally; however, the clean yard condition resulted in a significantly greater reduction of litter. The fact that the yards were more littered when the children were paid for volume was attributed to the fact that the children tended to pick up only the larger pieces of litter and, occasionally, they were suspected of turning in garbage that was taken from garbage containers. Another strategy which eliminated this problem is providing rewards for the return of randomly placed, indetectably marked items of litter (Hayes, Johnson, & Cone, 1975). Youth center inmates were informed that these items were planted, and that they could earn 25 cents or the opportunity to participate in one of a list of special activities if one of these items was found in a bag of litter which they turned in. The amount of litter was

reduced in the three sample areas by 55%, 88% and 71% respectively.

Reinforcement contingencies were effective with adults as well as children in a study conducted in an unsupervised forest area (Powers, Osborne, & Anderson, 1973). Trash cans were made available with demographic data cards, trash bags, and a sign explaining that people could receive either 25 cents or a chance on a $25.00 lottery by depositing a full bag of litter and filling out a data card. Seventy-three percent of the respondents chose the lottery chance. The age range of the respondents was 4 to 41 years with the majority (58) between the ages of 11 and 25. Seventy-three percent of the people who filled out cards chose the lottery chance. One hundred eighty-seven bags of litter totaling 1,655 pounds were removed during the 21 week study.

The studies cited so far have aimed to reduce the litter on the ground; however, reinforcement contingencies have also been used to increase the probability that people will deposit their litter in a container rather than littering. A sign was placed by a trash can in a zoo which read, "At times persons depositing litter in this container will be rewarded." On the average, every twentieth person in one condition and every tenth person in another condition was given a ticket good for a free Pepsi after depositing garbage in the can. In the first condition, litter deposits

increased from 723 to 4,577, and in the second condition, from 2,400 to 6,033 deposits (Kohlenberg & Phillips, 1973).

Procedures other than reinforcement have been used to prevent littering, e.g., prompts have been provided for people not to litter. A prompt can be either an overt message not to litter or a cue not to litter such as a trash can or litter bag. Anti-litter messages were effective in reducing litter in a grocery store (Geller, Witmer, & Orebaugh, 1976). Customers were given handbills which listed the store's specials of the week and contained a variety of litter messages. The messages given included: (1) a general message--"Please don't litter. Please dispose of properly."; (2) a specific message--"Please don't litter. Please deposit in the green trash can located in the back of the store."; (3) a demand message--"You must not litter. You must dispose of for recycling in the green trash can in the rear of the store."; (4) a recycling message--"Please help us recycle. Please dispose for recycling in the green trash can in the rear of the store." The general anti-litter message reduced the number of handbills that littered one store by more than 50%. The recycling message was found to be slightly more effective than the specific and demand messages which demonstrated no difference in prompting deposits in the green can.

Providing a container for litter has been shown to result in a partial reduction in highway litter (Finnie,

1973). Garbage containers were placed along the highway which were preceded by a sign one quarter mile ahead of the container. There was 29% less litter in sample areas preceded by litter stations; however, there was no significant difference in the amount of litter between areas that were preceded by a sign and those that were not.

Several procedures have been demonstrated to be cost-effective as well as effective in reducing litter. It was estimated, in the study which was conducted in a forest campground, that a litter cleaning job equal to the one done by children in two hours for $3.00 worth of prizes would have cost $50-$60 and taken 16-20 man hours (Clark et al., 1972). The cost effectiveness of providing rewards to children for picking up litter in an amusement park was compared with that of the park's maintenance staff (Casey & Lloyd, 1977). A free ride ticket was given to each child who turned in a full bag of litter. The cost of removing the litter was divided by the percent of litter removed to calculate a cost-effectiveness ratio for three age groups of children and for the maintenance staff. The three age groups of children were the all age group, the 12 and younger group, and the 13 and older group. The all age group was most cost effective with a ratio of 0.08; the 12 and younger group had a ratio of 0.09; the 13 and older group had a ratio of 0.10 while the maintenance staff had a ratio of 0.22.

Even though many of these procedures have been shown to be both effective and cost-effective on a limited scale no large scale application of them has been implemented (Osborne & Powers, 1980). In the Casey and Lloyd study, for example, even though the procedure was more cost effective than the standard litter cleaning procedure it was not continued when the experimenter withdrew from the setting. Perhaps this was due to the fact that park attendance did not increase when the park was less littered (Lloyd, Note 1).

The present study describes an attempt to deal with the litter problem in the Drake University neighborhood in Des Moines, Iowa. Des Moines is in the population category described as the most heavily littered (Strickland & Leggett, 1970). The city government does not pick up litter in residential areas (Westover, Note 2). The Drake area, in particular, seems to have a very serious litter problem. The problem may be exacerbated by the fact that the area surrounds the Drake University campus. Many houses have been converted into apartments which are occupied by transient students and an increase in the crime rate in the area seems to have led many more stable families to move to other neighborhoods. The Drake Neighborhood Association was formed by a group of neighborhood residents to explore solutions to some of their problems, including the litter problem, and a litter committee was formed.

The experimenter was contacted by this committee to

help plan a litter clean-up drive. The purpose of the clean-up drive was to restore a sense of pride in the neighborhood by making it more attractive. The litter drive committee wanted a procedure that could easily be used in future drives and one which did not involve the use of extrensic reinforcers. They felt that a clean neighborhood should function as the reinforcer for picking up the litter.

Since standard reinforcement procedures were ruled out it was necessary to select another type of procedure which could make the litter drive a success. Other organizations which conduct "drives" were contacted, e.g., the American Cancer Society. These organizations all reported using similar procedures. Generally, their procedures involved identifying area captains who are responsible for recruiting block solicitors. The area captain provides each block solicitor in his/her area with the information and material needed to solicit donations. The solicitor then visits each home on his/her block and discusses the goals of the society and the benefits of the fund-raising drive and collects donations (Jackson, Note 3). This organizational structure appeared to be one which could be applied to a litter clean-up drive. For example, one person from each block could be recruited by the litter drive committee to contact each resident on the block for the purpose of organizing a team of residents to pick up the litter on their block on a litter clean-up day. The purpose of this

study was to compare the amount of litter left on the ground after a clean-up drive in experimental blocks with block leaders to a control block without a block leader.

# CHAPTER II

# METHODS

## Setting

This study took place in the neighborhood surrounding Drake University in Des Moines, Iowa. It was conducted in conjunction with the Drake Neighborhood Association's Spring clean-up drive which was held on April 12, 1980. Ten blocks with volunteer block leaders served as experimental blocks. Ten control blocks were selected by looking at a map of the area and matching each experimental block with another block that appeared to be the same size and have a similar degree of traffic flow.

## Litter Observation Procedure

Ground litter was defined as any item of paper, wood, glass, metal, plastic, rubber, fabric, leather, food, or food by-product greater than two inches in diameter. Other items, such as grass, leaves, twigs, branches, rocks, animal feces, toys, furniture, and garbage containers were not counted as litter. Observers counted the litter in arbitrarily selected sample areas on the blocks before and after the clean-up drive. These sample areas included three ten foot long areas of devil strips (the grass covered areas between the street and sidewalk); three areas of front yards which were three feet by nine feet, three 10 foot long

alley areas including the pavement and the areas extending three feet on both sides of the pavement or, in blocks with no alley, the entire curb area on the one side of one street from the beginning of the block to the end of the block. The observers were provided with maps which marked the sample areas on each block and with written descriptions of the location of these areas. The procedure specified that each observer would measure the area with a yardstick and mark its border with chalk or a small white sticker. The observer would walk around the perimeter of the area counting all visible pieces of litter. If the observer had difficulty identifying or determining the size of an item he/she would walk into the area and measure the item with a two inch clear plastic disc.

Ten volunteers served as litter observers. Six observers were trained. They counted litter in a non-experimental area until reliability with the experimenter was 85%. The four observers who were not trained had prior experience in observing and recording data.

Litter Observation Reliability

Reliability was independently assessed by the experimenter in one sample area on nine of the twenty blocks before the clean-up drive and on each of the blocks after the clean-up. A Pearson's Product Moment Correlation Coefficient was calculated between the two sets of observations.

## Experimental Procedure

Experimental group. Each block leader was asked to organize a team of residents from his/her block to pick up the litter on the block. The block leaders were given those pages of the Des Moines City Directory which listed the names, addresses, and telephone numbers of the residents on their blocks. It was suggested that they contact each household to tell the residents about the clean-up drive, and to leave a card which specified time, date, and designated meeting place. On the day of the clean-up drive they met with the team, pointed out the heavily littered areas, distributed garbage bags, and arranged for disposal of the collected litter.

Control group. Each resident who attended the regular monthly meeting of the Drake Neighborhood Association was informed of the litter clean-up drive and requested to clean his/her block on the litter clean-up day. In addition, the event was promoted by local radio and television stations, in local and campus newspapers, and with signs which were placed on the Drake campus and in local businesses.

# CHAPTER III

## RESULTS

The number of pieces of litter in the sample areas in which reliability was assessed is shown in Table 1. Reliability between the observers and the experimenter was .97.

Table 2 shows the total number of pieces of litter on the ground in the pre and post litter clean-up condition. Figure 1 shows that before the clean-up drive a total of 317 pieces of litter were counted in the experimental blocks ($\bar{X}$=31.7, sd=18.9). After the clean-up drive 127 pieces of litter were counted ($\bar{X}$=12.7, sd=14.53). Sixty percent of the litter was removed. In the control blocks 299 pieces were counted ($\bar{X}$=29.9, sd=18.7); 274 pieces were counted afterwards ($\bar{X}$=27.4, sd=19.97). Only 8% of the litter was removed.

An overall chi-square was calculated to test for significant differences between the two groups before and after the clean-up drive. Subsequently, individual chi-squares were computed for the pre-post conditions within both the experimental and control groups and for the differences between the groups.

The overall chi-square revealed a significant difference among the four cells (chi-square = 35.4, df=1, $p<.01$). The individual chi-squares demonstrated no significant difference in the amount of litter between the two

Table 1

Total Number of Pieces of Litter Recorded by Observers and the Experimenter in Areas in Which Reliability Data was Taken

| Sample Area | Observer | Experimenter |
|---|---|---|
| 1 | 0 | 0 |
| 2 | 5 | 2 |
| 3 | 2 | 2 |
| 4 | 1 | 1 |
| 5 | 1 | 1 |
| 6 | 2 | 3 |
| 7 | 0 | 3 |
| 8 | 31 | 24 |
| 9 | 2 | 2 |
| 10 | 2 | 2 |
| 11 | 0 | 1 |
| 12 | 0 | 0 |
| 13 | 1 | 2 |
| 14 | 2 | 2 |
| 15 | 14 | 12 |
| 16 | 0 | 2 |
| 17 | 0 | 0 |
| 18 | 0 | 0 |
| 19 | 0 | 0 |
| 20 | 0 | 0 |
| 21 | 5 | 3 |
| 22 | 0 | 0 |
| 23 | 0 | 1 |
| 24 | 2 | 3 |
| 25 | 17 | 21 |
| 26 | 18 | 14 |
| 27 | 1 | 0 |
| 28 | 0 | 0 |
| 29 | 1 | 1 |

Table 2

Total Number of Pieces of Litter on the Ground in Pre and Post Litter Clean-up Conditions

| | Experimental | | Control | |
|---|---|---|---|---|
| Block | Pre | Post | Pre | Post |
| 1 | 35 | 12 | 9 | 7 |
| 2 | 63 | 50 | 45 | 40 |
| 3 | 11 | 0 | 1 | 1 |
| 4 | 14 | 18 | 12 | 0 |
| 5 | 16 | 13 | 24 | 24 |
| 6 | 42 | 19 | 66 | 60 |
| 7 | 66 | 15 | 47 | 37 |
| 8 | 17 | 0 | 34 | 54 |
| 9 | 31 | 0 | 34 | 32 |
| 10 | 22 | 0 | 26 | 19 |

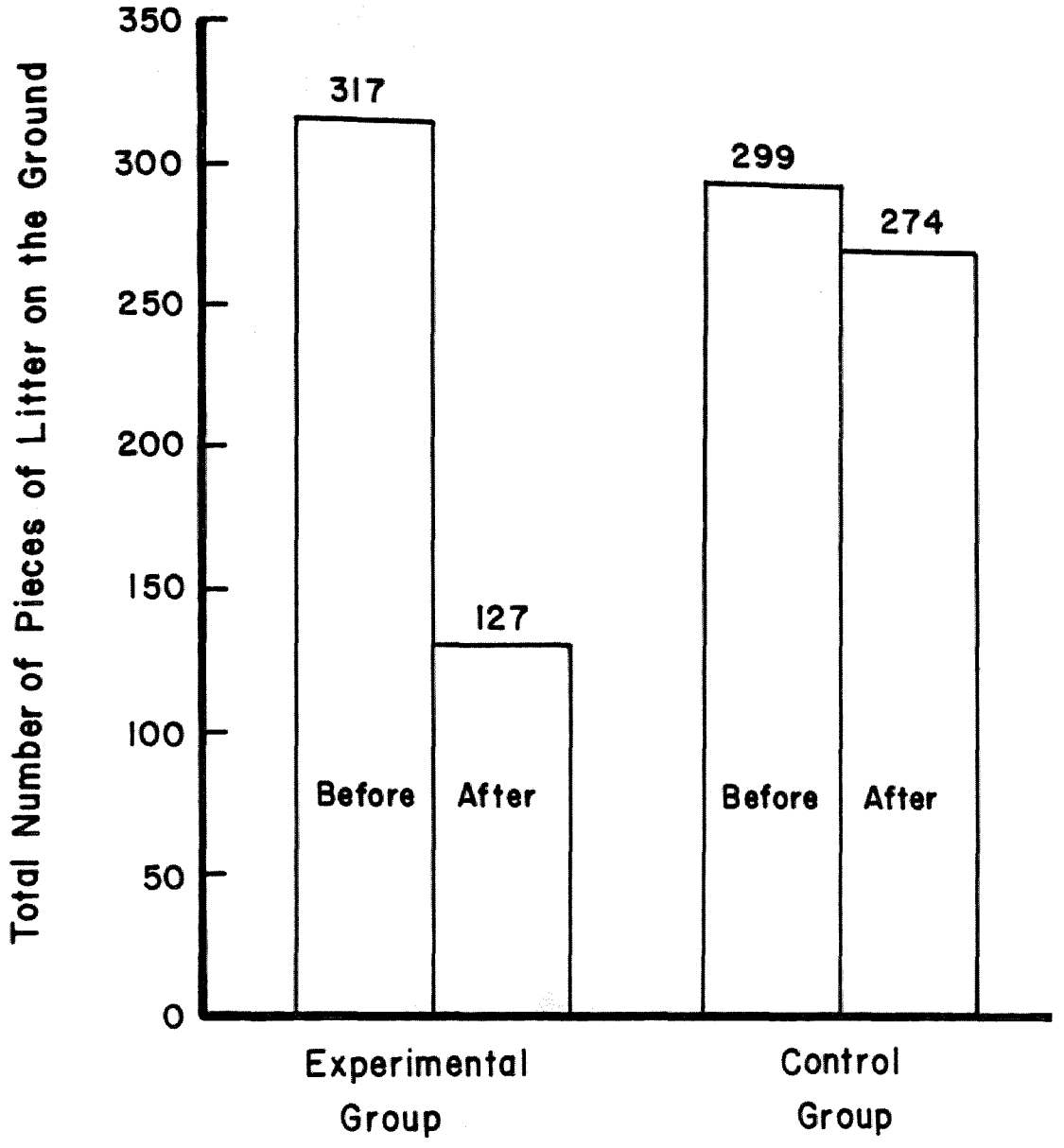


Figure 1. Total number of pieces of litter on the ground before and after the litter clean-up drive in the experimental and control blocks.

groups prior to the litter drive (chi-square = .26, df=1, $p>.01$) and a significant difference between the two groups after the drive (chi-square = 53.89, df=1, $p<.01$). A significant difference was shown between the pre-post measures in the experimental group (chi-square = 81.31, df=1, $p<.01$); whereas, no significant difference was found in these measures for the control group (chi-square = 1.09, df=1, $p>.01$).

Dunn's procedure was used to control for alpha slippage produced by conducting a posteriori and non-orthogonal chi-square test on the same data following the overall chi-square test. Using Dunn's procedure, the 0.01 alpha level used per comparison holds alpha constant at the .05 level for the entire collection of tests.

# CHAPTER IV

## DISCUSSION

Block leaders were effective in getting the residents to pick up litter on their blocks. This procedure was demonstrated to be somewhat less effective than most of the reinforcement procedures which were cited earlier. For example, 95% of the litter was picked up when children were rewarded with movie tickets (Burgess et al., 1971); 72% was picked up when children were given the opportunity to earn prizes for cleaning up a forest area (Clark et al., 1972); and 55%, 88% and 71% of the litter in three separate areas was removed when youth center inmates were given either 25 cents or the opportunity to engage in special activities for turning in bags of litter that contained indetectably marked items (Hayes et al., 1975). Sixty percent of the litter on the ground in the present study was removed. However, the block leader procedure was more effective than any of the procedures cited that made use of prompts, e.g., 50% of the litter was removed when anti-litter handbills were distributed in a grocery store (Geller et al., 1976); 36% of the litter was removed when children were given litterbags and instructions to fill them and return them (Burgess et al., 1971); and 29% less litter was found in highway areas preceded by trash cans (Finnie et al., 1973). The fact that this procedure was less effective than so many reinforcement

studies suggests that having a clean neighborhood did not function as a reinforcer that is as effective as many tangible reinforcers.

Apparently residents were willing to pick up litter only if they were asked to participate in a formalized activity by a neighbor. The block leaders, in turn, were willing to organize their neighbors to pick up the litter only after the association legitimized this behavior by identifying them as block leaders. Advertising in the absence of block leaders did not seem adequate to get the residents to pick up litter. The event received equal advertising coverage for residents in the experimental and control blocks; however, there was little reduction in the litter in the control blocks where there were no block leaders.

It is unclear if block leaders in other clean-up drives would be as successful as these. The block leaders in this study knew that data were being collected and may have worked harder because they felt that their own performance was being measured and evaluated. Further research could determine if reactivity is an important factor in the effectiveness of the block leader procedure. If so, a simple evaluation system could be announced in which random blocks would be rated on cleanliness.

Further research could also be directed at discovering whether the block leader procedure can be applied to

other projects such as recycling drives. Procedures which enhance the block leader's effectiveness such as providing training or incentives might be investigated as well.

This procedure, like many of the procedures in previous litter studies was both effective and inexpensive to implement. It can be used without the assistance of a trained experimenter. The block leaders served the additional function of providing information about the association to neighbors who had not previously been involved. When they visited the residents of their blocks to talk about the litter drive they were able to discuss the goals of the organization and the other activities with which it is involved. This public relations function was valued by the association since they were interested in getting as many residents as possible to be members. It will be interesting to see if the effect of the block leader procedure was great enough to maintain its use by the Drake Neighborhood Association in subsequent litter drives or if it will be discontinued like many of the other litter control procedures which have been cited.

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